

«If only this flange had an isolation valve...»



Isolation without shut down

AOGV™

Add On Gate Valve

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Principal Engineer AOGV
Business Development & Sales Manager

Agenda

- Background – 30 years history
- AOGV
 - Main steps
 - Cases / Applications
 - Safe design – conformance to standards
 - Business Drivers
- Questions & Answers





Services

- Process Plant Services (on & offshore)
- Subsea Repair & Modification Solutions
- Pig Development, Refurbishment & Support Services
- Torque & Tension Technology & Services
- Calibration Services
- Application Engineering – Electronics Design & Communication
- Rental Tools

Products

- Pipe & Pipeline Isolation Tools
- Repair Clamps Subsea & Topsides
- Pigs & Accessories
- Pipeline Pig Tracking & Communication
- Pressure Testers & Equipment



from EPC contracts to sale of products and hire services for a fleet of products

Challenge Accepted

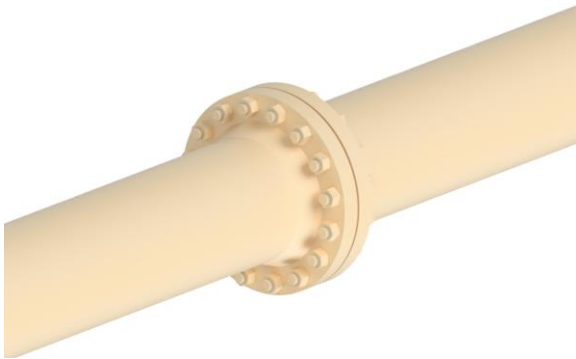
AOGV – Add On Gate Valve Isolations without shutdowns

- Inserts an blind spade on a live flange couple
- Service provision
- 2-3 man specialist installation crew
- Field proven
- Increased up time by reducing:
 - Drainage
 - Venting
 - Purging
 - Flushing
 - Recommissioning



Challenge Accepted

AOGV inserts blind flanges



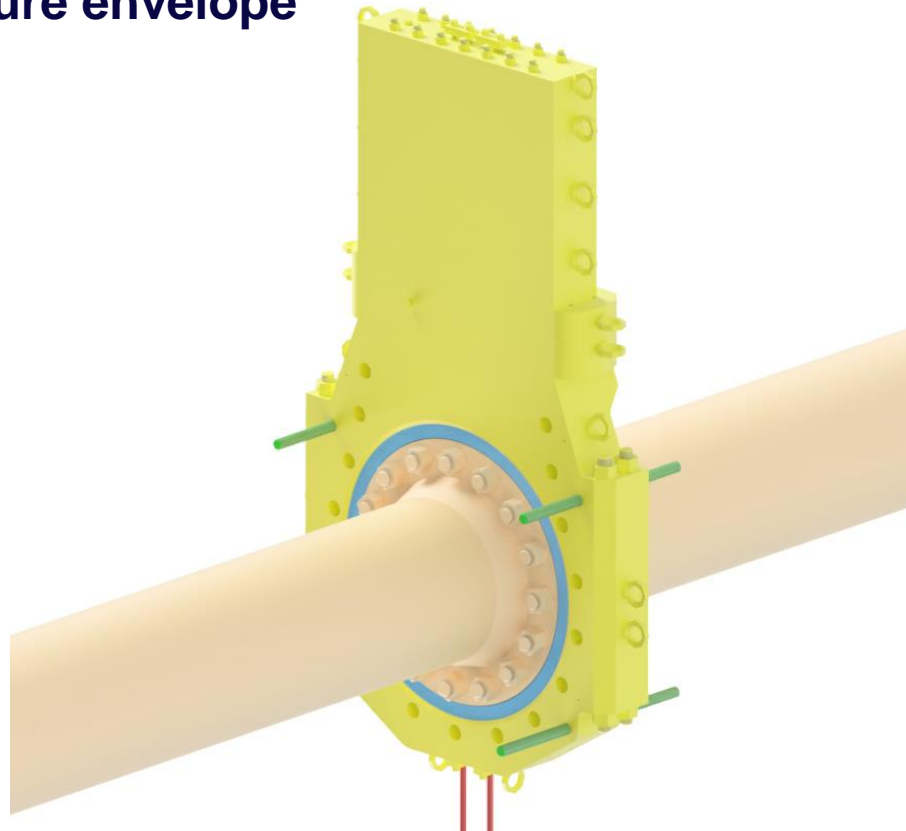
Challenge Accepted

AOGV – Dynamic seals on flange



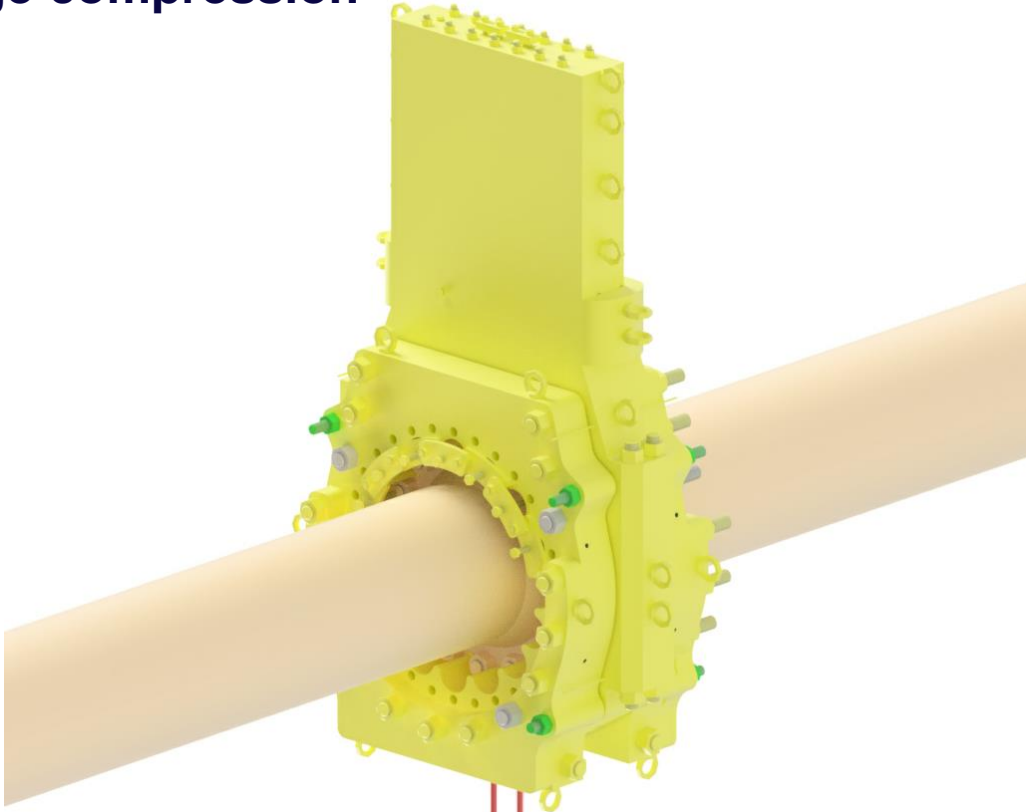
Challenge Accepted

AOGV – Pressure envelope



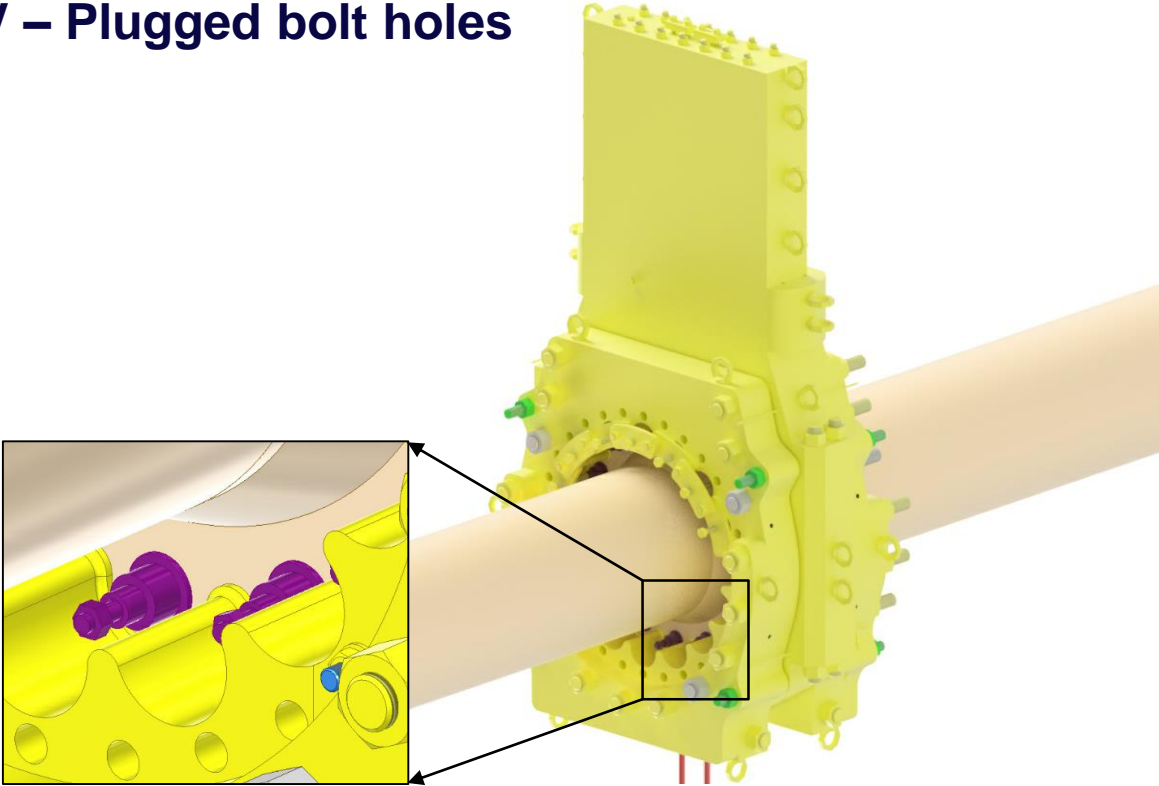
Challenge Accepted

AOGV – Flange compression



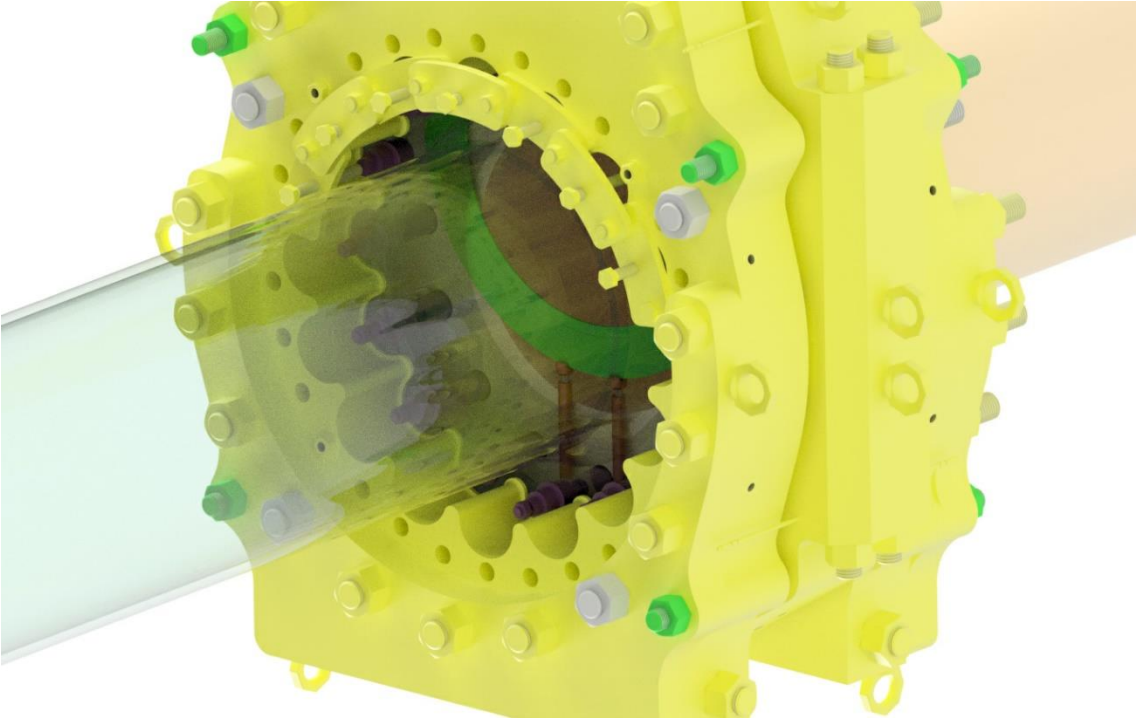
Challenge Accepted

AOGV – Plugged bolt holes



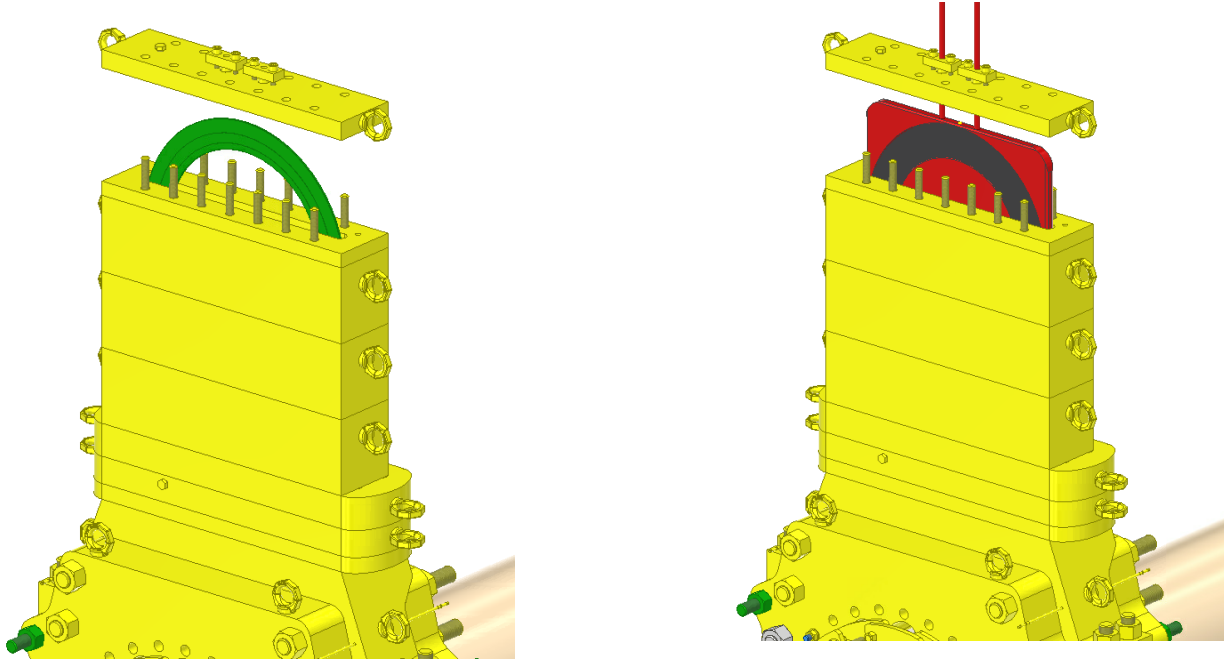
Challenge Accepted

AOGV – Flanges split, gasket removed



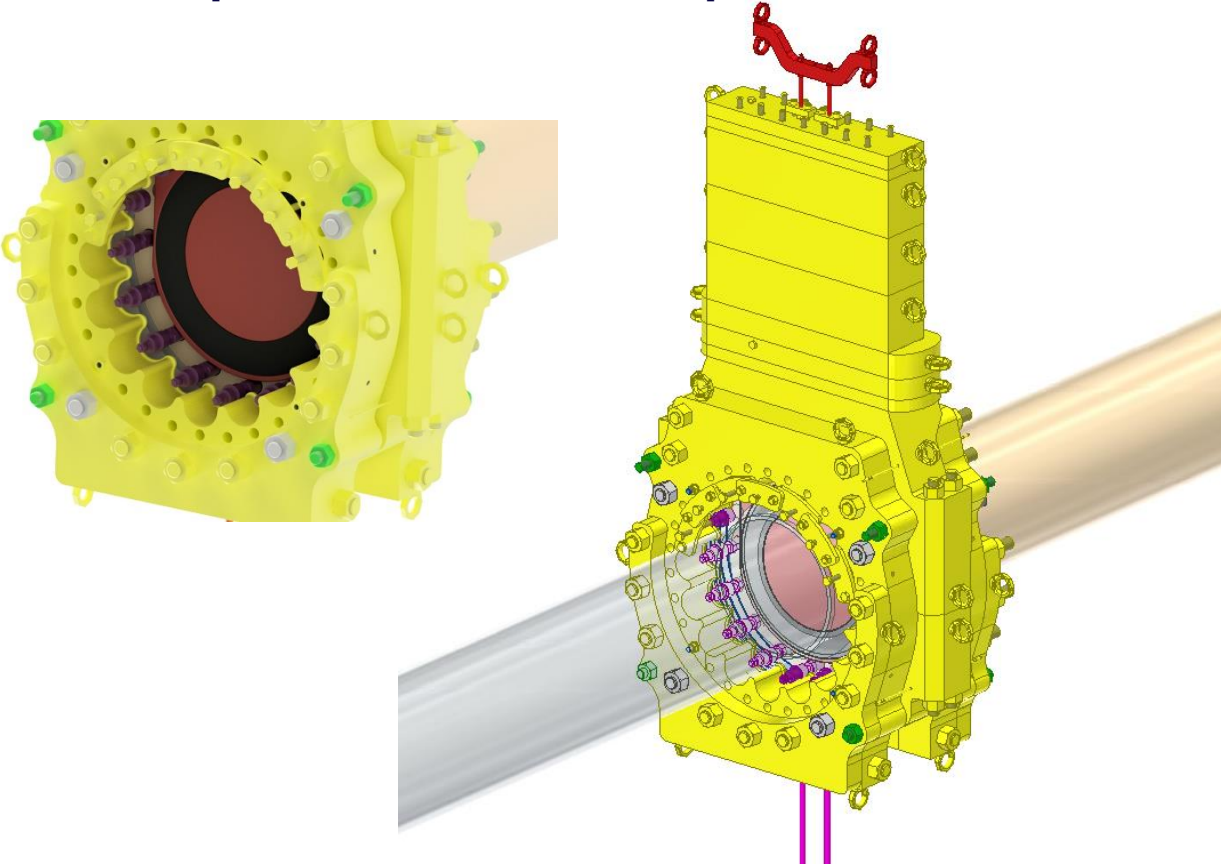
Challenge Accepted

AOGV – Blind spade

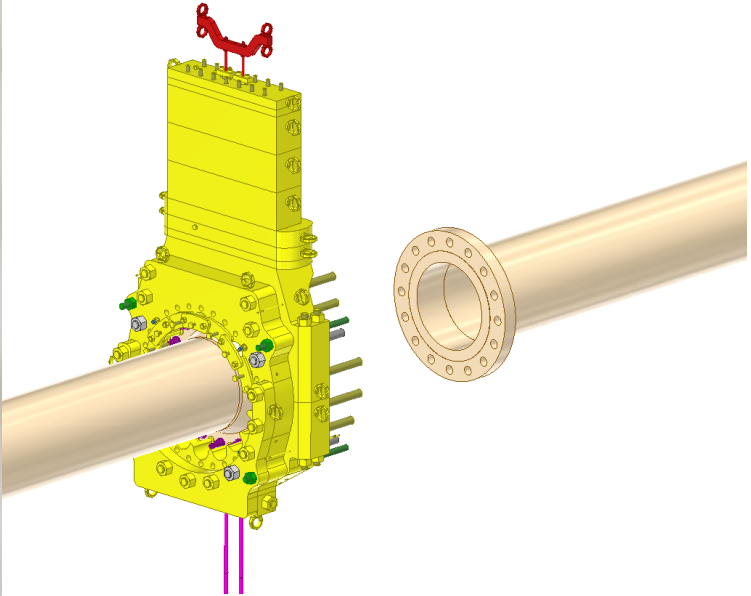
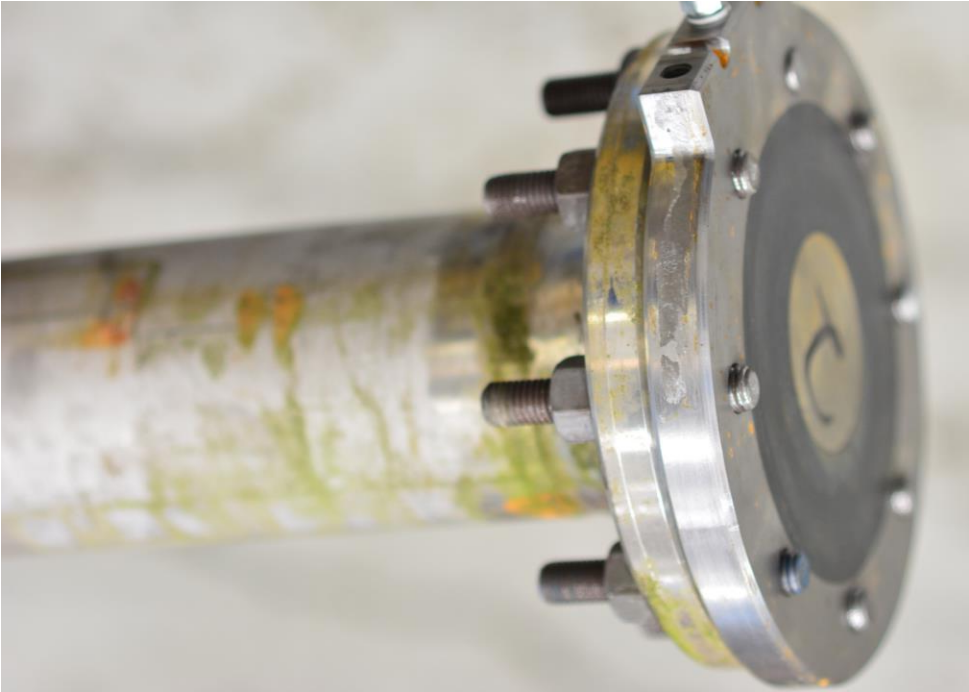


Challenge Accepted

AOGV – Blind spade – isolation complete



Insert a blind flange and remove the tubular

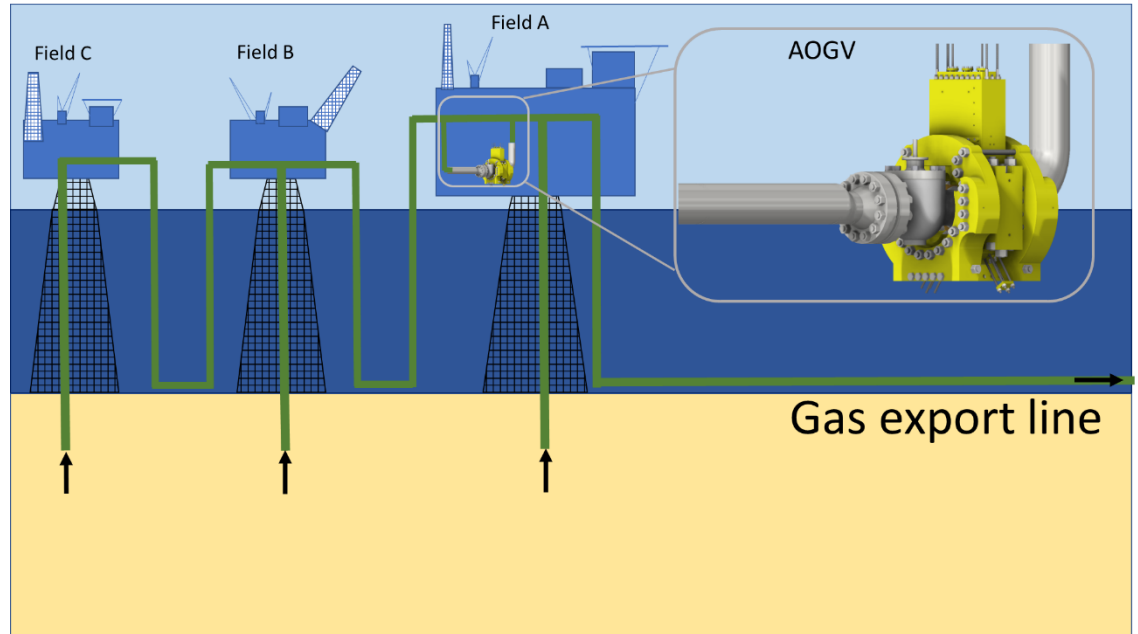


AOGV – valve maintenance at full production

- International operator
- 8" Class 1500
- Purpose: Valve maintenance
- 3 fields can remain in live production during operation
- Gas export system segregation
- Design pressure 150 Bar
- Increased uptime securing operator revenue stream



Valve to be isolated



Overview of process

Challenge Accepted

Valve repair - 8" 150 bar

- AOGV operated 2 times
- Flanges separated
- Gasket removed and Isolation spade inserted
- Isolation confirmed
- Maintenance performed
- Process reversed and line recommissioned



Gasket removed from live 150 HC Gas system



Recomissioned system post AOGV operation



AOGV operation ongoing



Leak test 165 bar

Challenge Accepted

Live replacement of ESD Valve

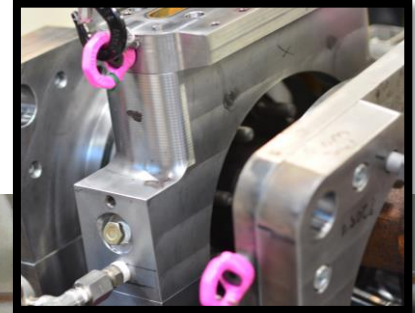
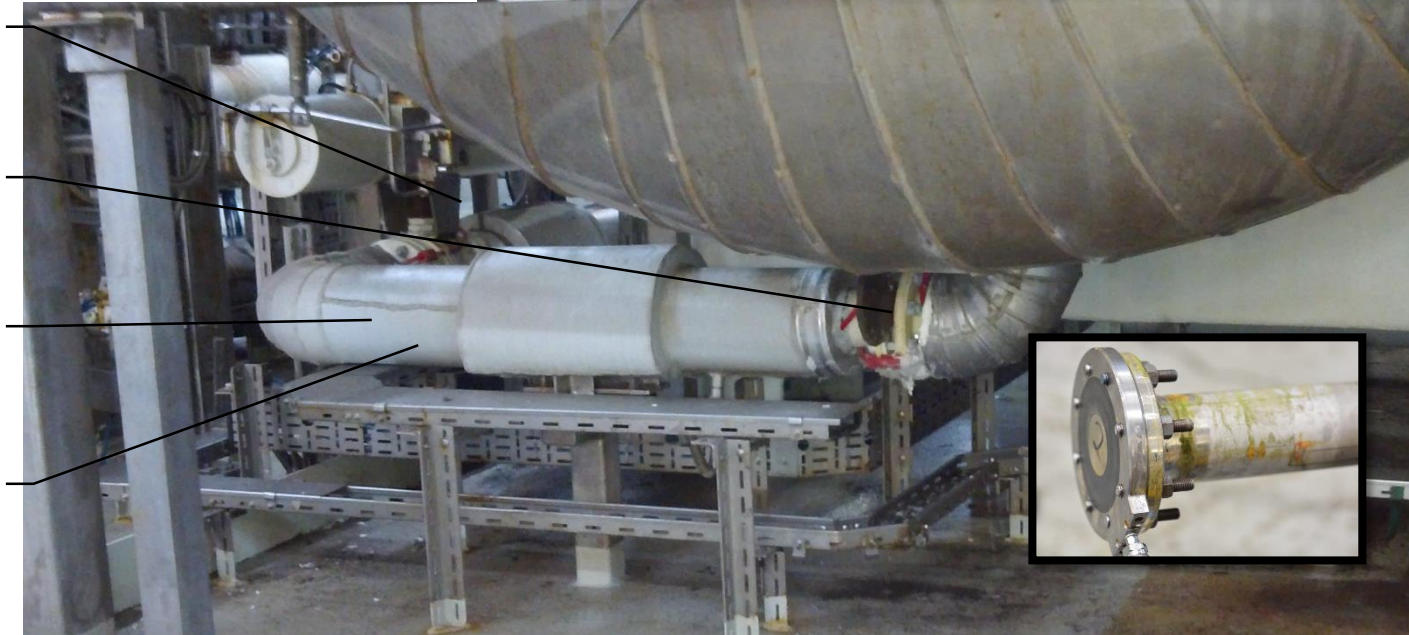
- Replacing valves and pumps in live process plants
- Inserts and removes blinds in flanged connections
- Purge the isolated segments through the AOGV

Step 1:
Disconnect flange #1
Remove gasket
Insert double acting blind flange

Step 2:
Disconnect flange #2
Remove gasket
Insert double acting blind flange

Step 3:
Purge spool through the tool
Remove spool and valve

Step 4:
Install new valve with spool
Remove blind flanges
Reconnect flanges with new gaskets and flange bolts
Plant Operation back to normal



AOGV- Valve replacement

- Replacing isolation valves topsides
- 20" Gas pipeline riser
- Pipeline 100km
- Positive isolation
- New gasket in flange

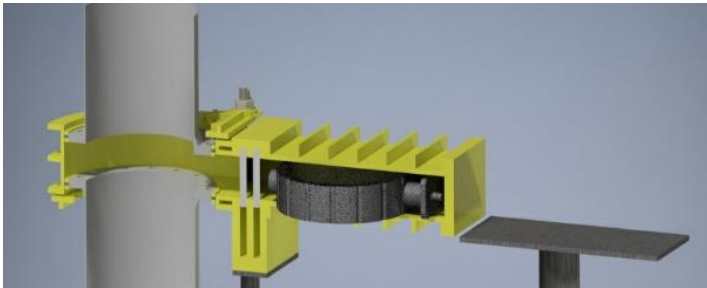
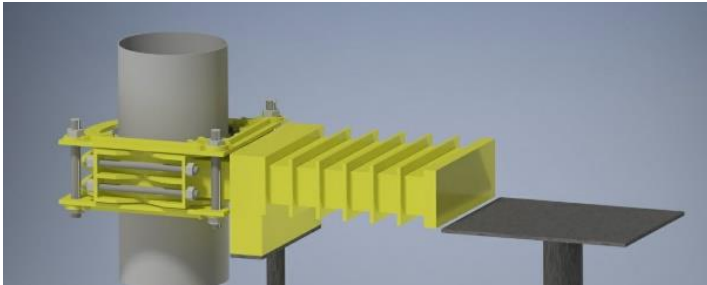


Challenge Accepted

Replace Butterfly valves online

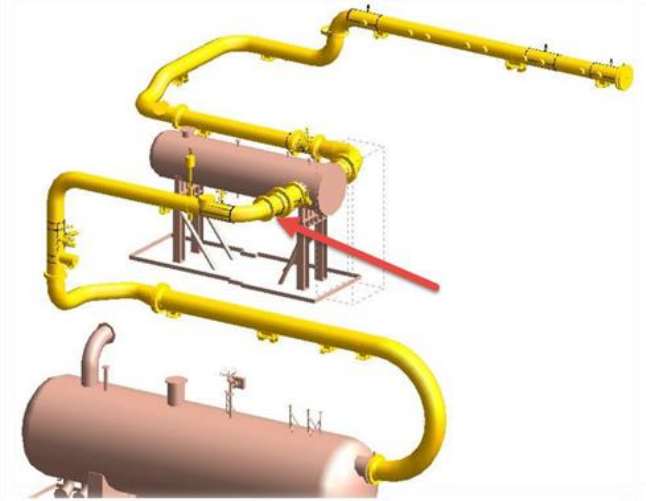
Isolate on the pipe flanges

Pull out and replace the butterfly valve through the launcher



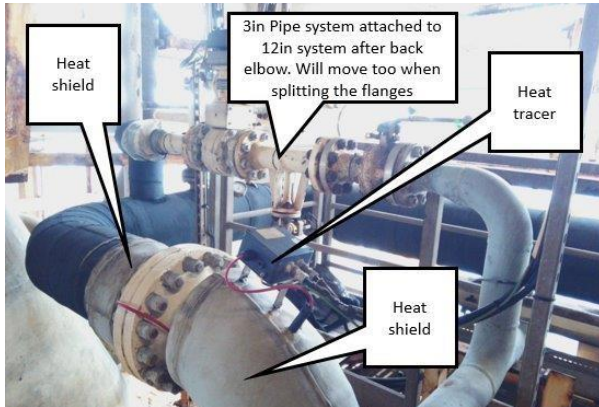
Live process segregation - 24"

- Scope: Isolate between flanges to enable intervention on a limited part of the process, liquid side in main process
- Save cost by reducing cleaning cost (75% reduction of cleaning volume) and time, and avoiding draining of production fluid.
- Operated 4 times in field on 2 separate flanges / locations

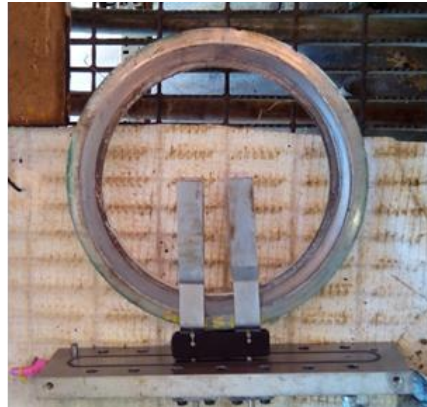


Slug catcher isolation - flashing sediments

- International operator
- 12" Class 300, 30 bar design
- Not possible to gas free during 21 day shut down
- AOGV Operated & Flanges separated
- Gasket removed, Isolation spade inserted, & isolation confirmed
- Maintenance performed
- Process reversed and line recommissioned



Flange to be isolated



Removed gasket from live system



AOGV isolation complete

Application of standards

- Relevant standards
 - Material selection
 - Allowable stress
 - Calculation rules
- The AOGV itself
- The AOGV / Flange interface
- The piping system
- Design vs Operation pressure

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13445-3

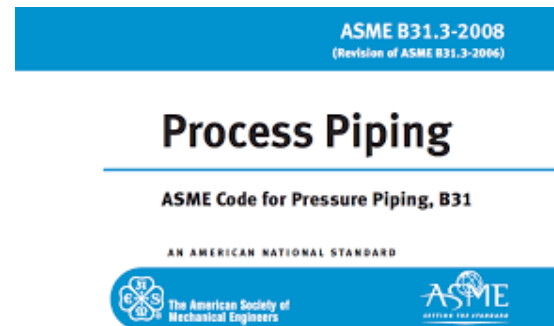
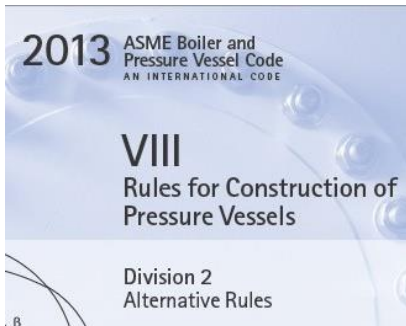
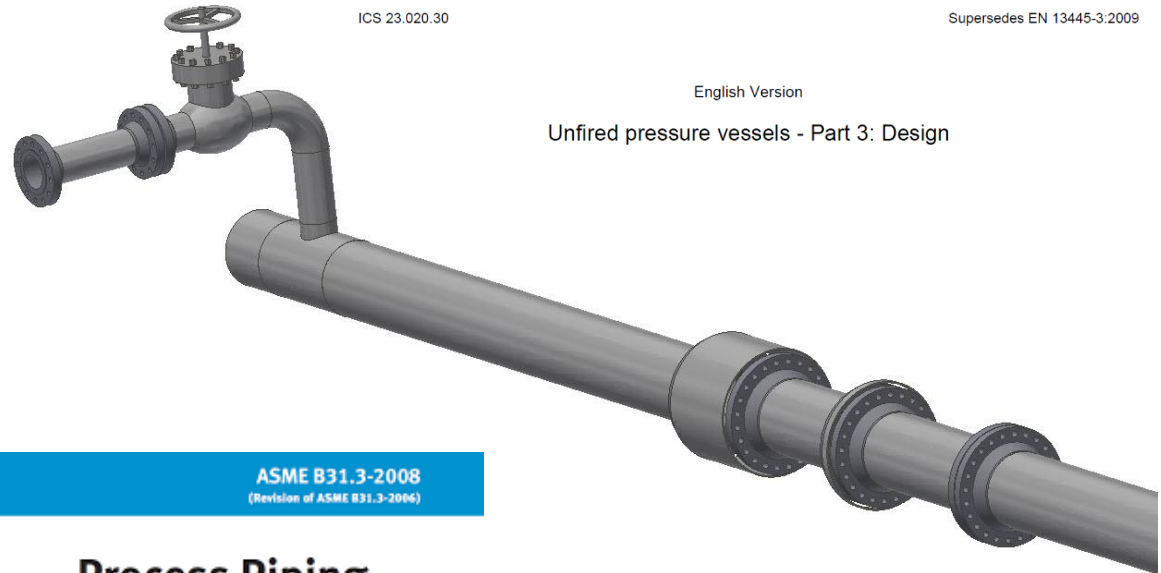
September 2014

ICS 23.020.30

Supersedes EN 13445-3:2009

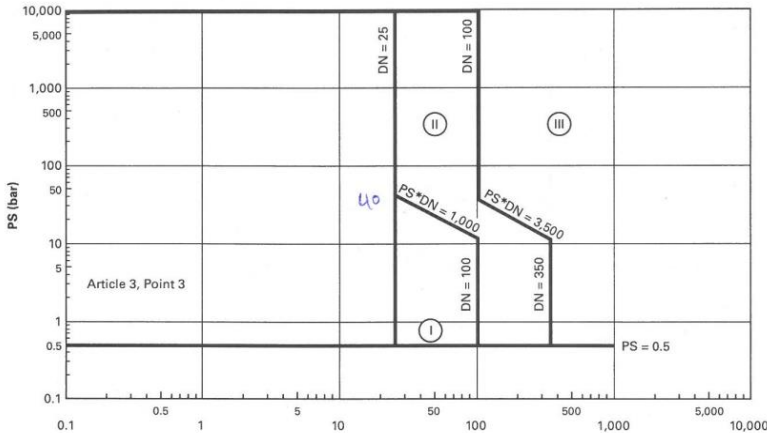
English Version

Unfired pressure vessels - Part 3: Design



Design verification – 150bar

- Standard – PED EN 13445
- Calculations – tool and interface
- FEM / FEA - Finite Element Analysis
- Notified Body – DnV GL
- CE Marked



Challenge Accepted



DNV·GL

Certificate No:
PEDG000007M

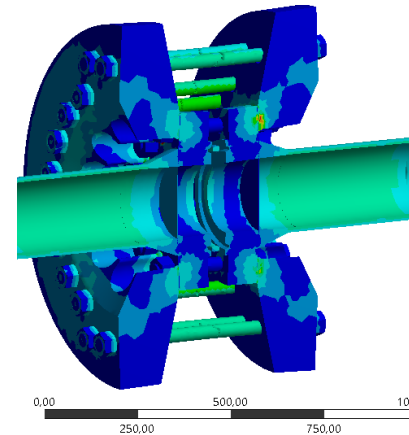
EU CERTIFICATE OF CONFORMITY

This is to certify:

That the product(s) **Pressure Accessory**

with name and/or type designation(s)
8" 1500# AOGV (Add On Gate Valve); S/N: 3030713-01

Manufactured by
IK-Norway AS
Stavanger, Norway

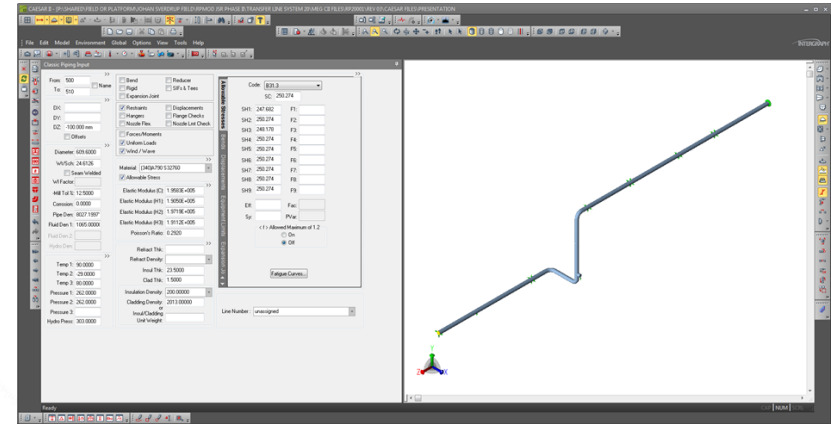
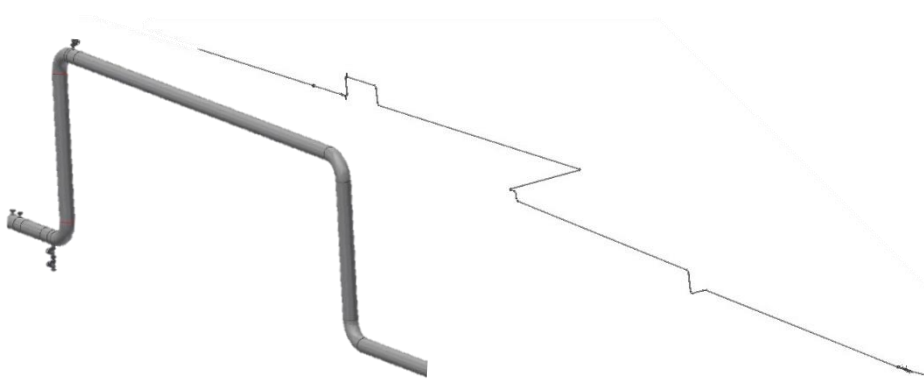
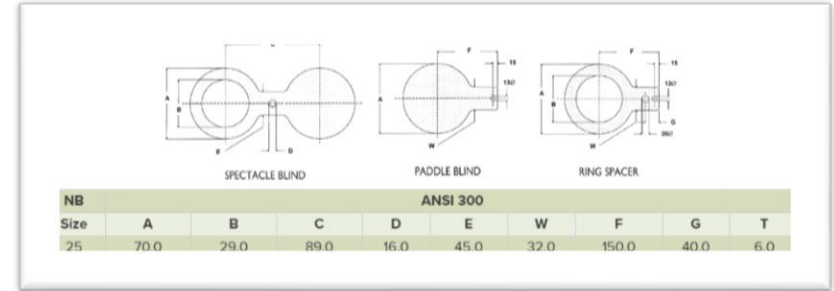


E: Copy of Copy of Static Structural
Equivalent Stress
Type: Equivalent (von-Mises) Stress
Unit: MPa
Time: 8
2018-03-02 23:00



Displacement vs stress

- Pipe flexibility – displacement
- Pipe spade (20mm – 75mm)
- Pipe supports – allow flexing
- Stress analysis - displacement
- Site survey



Site execution

- 3 – 6 days Arrival of equipment and personnel on site rigging and preparation, interface meetings, installation of AOGV
- 1 day Split flanges, remove gasket, insert spade and verify isolation
- X days Perform maintenance work / purpose of isolation (Operator / incumbent contractor)
- 1 day Retract spade, insert gasket, recommission system
- 2-3 days Disassemble tool, pack and demob



Business drivers

- Move scope out of TAR
 - Increased production through simplified isolation
- Isolate individual process train, valves or heat exchangers
- Increased up time by reducing drainage, venting, purging & flushing
- Strategy change for shut down and maintenance work
- Longer shut down intervals



Partnership review

Wide range of applications



Slug catcher isolation
Cryogenic -163 deg C

3"
20 Bar



Blind flange replacement

8"
10 Bar



Control valve isolation
Gas export

8"
150 Bar



Slug catcher isolation

12"
30 Bar



Heat exchanger isolation

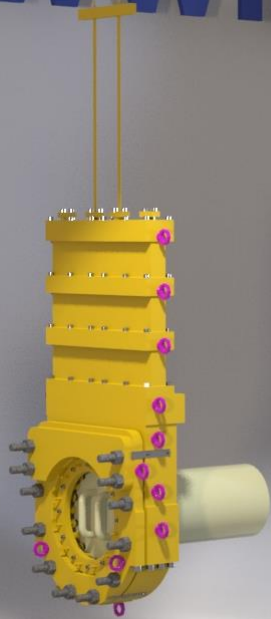
24"
16 Bar

Challenge Accepted

www.aogv.no



3in 150#
AOGV



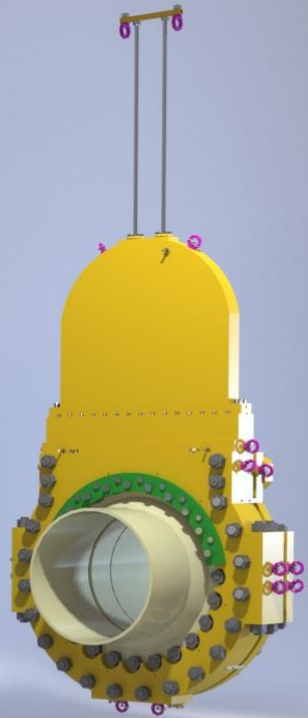
8in 150#
AOGV



8in 1500#
AOGV



12in 300#
AOGV



24in 300#
AOGV

AOGV – Isolation without shut down



12" Class 300



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Challenge Accepted

AOGV – Summary

The purpose of the tool is to enable safe isolations and to reduce extent and duration of production shutdowns, adding value of 2-20 MUSD per application. The principle design was developed within the Company addressing shortcomings of traditional isolation methods. The tool is field proven on a platform on the NCS.

Plants have large volumes which require substantial preparation and start up activities in relation to performing maintenance operations. The isolation tool can shorten shut down periods significantly thereby reducing cost.

Typical applications may include replacement of valves and piping, isolate heat exchangers for chemical cleaning or replacing leaking flange gasket with new gaskets and bolts. The live isolation tool can turn the original spectacle blinds on live systems, replace elements connected to piping systems, floating hulls, connections to high volume tanks.

The tool can be installed on a pair of flanges at the maintenance location and significantly reduces the need for drainage, venting purging and flushing.

A field proven tool for live process isolation has been demonstrated as a safe and cost saving technology. The technology is patented and is significantly different from existing methods of line stopping. There is a wide range of application areas in Facilities and Production Operations and the new tool will increase plant uptime.



Challenge Accepted

Repair Clamps SubSea & Topside

- Design, manufacturing and delivery (EPCI) of specialized clamp solutions, subsea and topside
- Temporary or permanent pipeline repair clamps
- Sealing and / or structural repair clamps
- Hot tap clamps for tie-ins or plugging / stoppling
- Patch clamps for local repairs
- Split clamps for grout / epoxy / sealant injection
- Competency Based Emergency Repair, fast-track delivery of repair solutions for leaking pipelines



Challenge Accepted

SubSea Repair & Modification Solutions

- Design, manufacturing and delivery (EPCI) of specialized solutions.
- Modification and repair of pipelines, structures and subsea production systems
- Supply of custom designed equipment and systems
- A variety of ROV and diver assisted custom made tools
- Competency Based Emergency Repair (fast track)
- SubSea MMO



Challenge Accepted

Pipe & Pipeline Isolation Tools

- Hydraulic and mechanical high and low Pressure Plugs for topside and subsea use
- AOGV™ - Ad On Gate Valve (Patented)
 - Isolation without shutdown
- Twin Tyre Flexible Isolation Plug
 - To provide positive isolation before hot work.
- ABIS and Mini ABIS - Air Bag Isolation System, when welding on hydrocarbon filled systems.
- Valkyrie – Specialised Back-Gas shield weld purging system.
- High Friction Pig - Used to provide a low pressure, high seal isolation.
- SkadiPlug™ - Remote operated plug system using ice plugs.



Challenge Accepted

36 Years

- Special pipe clamps subsea and top side
- Sealing on flange circumference
- Mechanical plugs
- Calculations – EN (PED) / ASME
- Barrier philosophy – verification steps
- Handling of mechanical loads in piping system
- Dynamic seals – Rods / Bolts
- Bolting technology

